

# RF Transformer

50Ω 2400 to 2500 MHz 1:4 Ratio

## BLJC4-252R+



Generic photo used for illustration purposes only  
CASE STYLE: JC0603C

**+RoHS Compliant**

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications



Available Tape and Reel at no extra cost

| Reel Size | Devices/Reel                      |
|-----------|-----------------------------------|
| 7"        | 20, 50, 100, 200, 500, 1000, 4000 |

### Maximum Ratings

|                       |               |
|-----------------------|---------------|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature*  | -40°C to 85°C |
| Input RF Power**      | 2W at 25°C    |

\*Refer to product storage temperature after installation. Suggestion for T&R unused product storage condition: +5-+35°C, Humidity 45-75%RH, 12 Month max. Permanent damage may occur if any of these limits are exceeded.

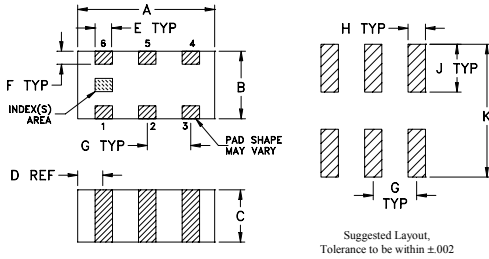
\*\*Derate linearly to 1W at 85°C.

### Pad Connections

|                               |     |
|-------------------------------|-----|
| PRIMARY DOT (Unbalanced Port) | 1   |
| GND or DC FEED                | 3   |
| SECONDARY DOT (Balanced)      | 4   |
| SECONDARY (Balanced)          | 6   |
| NO CONNECTION                 | 2,5 |

### Outline Drawing

PCB Land Pattern



### Outline Dimensions (inch/mm)

| A    | B    | C    | D    | E     | F    |
|------|------|------|------|-------|------|
| .063 | .031 | .024 | .012 | .008  | .006 |
| 1.60 | 0.79 | 0.61 | 0.30 | 0.20  | 0.15 |
| G    | H    | J    | K    | wt    |      |
| .020 | .010 | .022 | .053 | grams |      |
| 0.51 | 0.25 | 0.56 | 1.35 | 0.005 |      |

### Features

- miniature size 0603 (0.063" [1.6mm] x 0.031" [0.8mm] x 0.024" [0.6mm])
- low phase unbalance, 0.8 deg. and amplitude unbalance, 0.2 dB typ.
- low cost
- aqueous washable

### Applications

- ISM Band
- WLAN
- Bluetooth
- Zigbee

### Electrical Specifications at 25°C

| Parameter             | Frequency (MHz) | Min. | Typ. | Max. | Unit   |
|-----------------------|-----------------|------|------|------|--------|
| Impedance Ratio       |                 |      | 4    |      |        |
| Frequency Range       |                 | 2400 | —    | 2500 | MHz    |
| Insertion Loss*       | 2400 - 2500     | —    | 0.9  | 1.5  | dB     |
| Amplitude Unbalance   | 2400 - 2500     | —    | 0.2  | 2    | dB     |
| Phase Unbalance†      | 2400 - 2500     | —    | 0.8  | 10   | Degree |
| Unbalance Return Loss | 2400 - 2500     | 9.5  | 24   | —    | dB     |

\* Tested on Evaluation Board TB-1013+

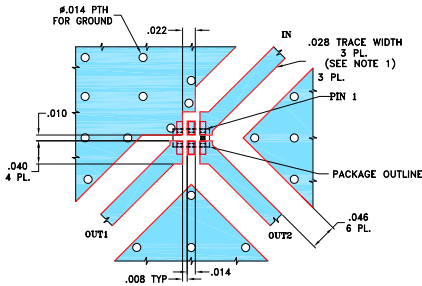
† Relative to 180°

### Typical Performance Data at 25°C\*\*

| FREQUENCY (GHz) | INSERTION LOSS (dB) | INPUT R. LOSS (dB) | AMPLITUDE UNBALANCE (dB) | PHASE UNBALANCE (Deg.) |
|-----------------|---------------------|--------------------|--------------------------|------------------------|
| 2.40            | 0.97                | 20.36              | 0.09                     | 1.02                   |
| 2.41            | 0.95                | 21.08              | 0.12                     | 0.94                   |
| 2.42            | 0.94                | 21.77              | 0.15                     | 0.85                   |
| 2.43            | 0.93                | 22.39              | 0.18                     | 0.78                   |
| 2.44            | 0.91                | 22.91              | 0.21                     | 0.65                   |
| 2.45            | 0.90                | 23.32              | 0.24                     | 0.52                   |
| 2.46            | 0.89                | 23.46              | 0.27                     | 0.46                   |
| 2.47            | 0.88                | 23.39              | 0.30                     | 0.32                   |
| 2.48            | 0.88                | 23.05              | 0.32                     | 0.21                   |
| 2.49            | 0.87                | 22.54              | 0.35                     | 0.08                   |
| 2.50            | 0.87                | 21.97              | 0.38                     | 0.12                   |

\*\* Measured with Agilent E5071B network analyzer using impedance conversion and port extension.

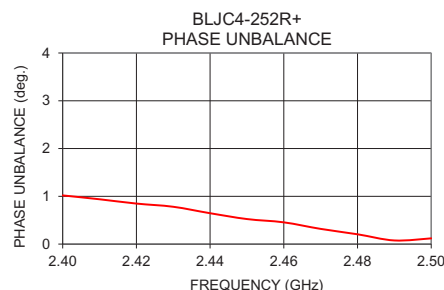
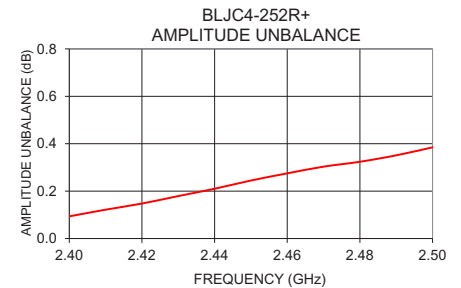
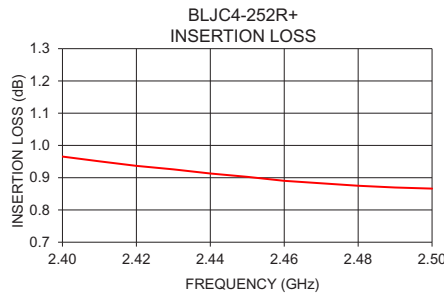
### Evaluation Board MCL P/N: TB-1013+ Suggested PCB Layout (PL-559)



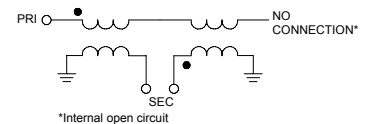
- NOTES:
1. TRACE WIDTH IS SHOWN FOR FR4, GRADE IT-180TC (TECO CORP.) WITH DIELECTRIC THICKNESS .016±.0015, COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
  2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

### Notes

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)



### Configuration J



\*Internal open circuit

*Typical Performance Data*

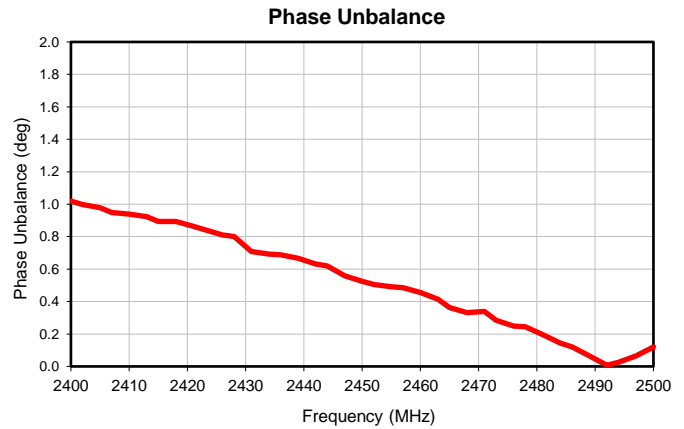
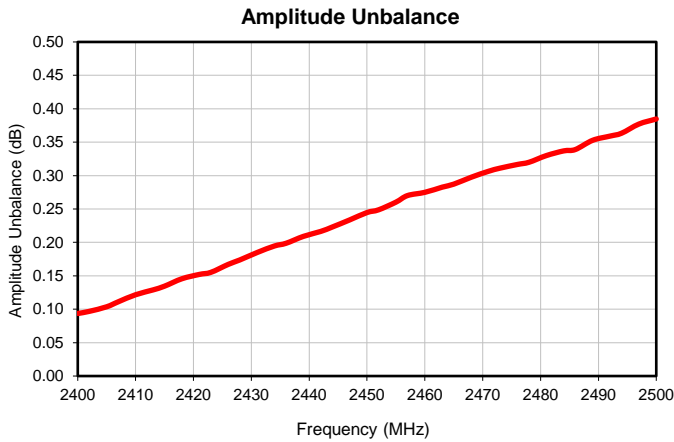
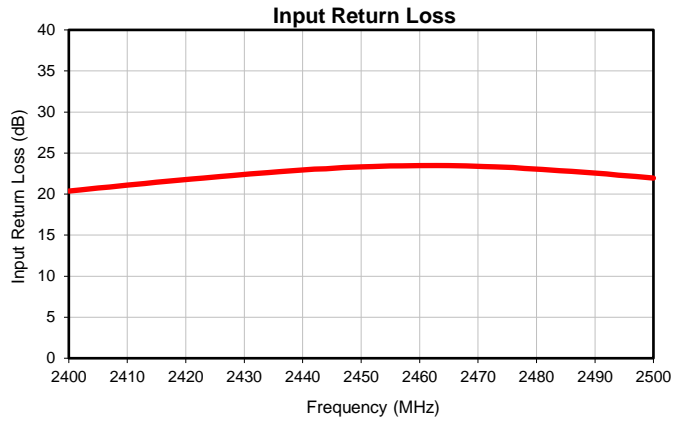
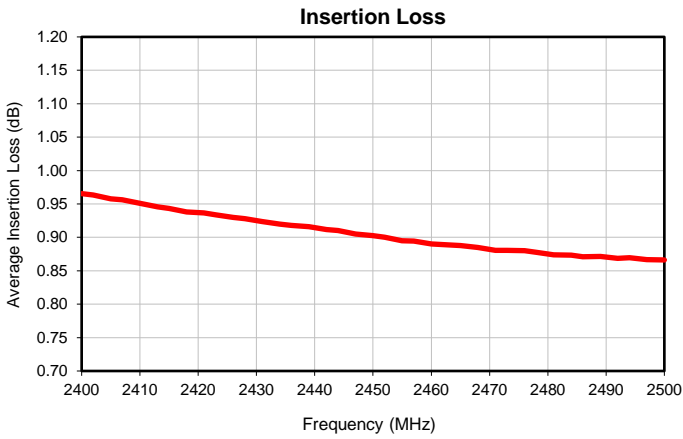
| FREQUENCY<br>(MHz) | AVERAGE<br>INSERTION LOSS<br>(dB) | INPUT<br>RETURN LOSS<br>(dB) | AMPLITUDE<br>UNBALANCE<br>(dB) | PHASE<br>UNBALANCE <sup>(1)</sup><br>(deg.) |
|--------------------|-----------------------------------|------------------------------|--------------------------------|---|
| 2400               | 0.97                              | 20.36                        | 0.09                           | 1.02  |
| 2402               | 0.96                              | 20.50                        | 0.10                           | 1.00  |
| 2405               | 0.96                              | 20.74                        | 0.10                           | 0.98  |
| 2407               | 0.96                              | 20.87                        | 0.11                           | 0.95  |
| 2410               | 0.95                              | 21.08                        | 0.12                           | 0.94  |
| 2413               | 0.95                              | 21.30                        | 0.13                           | 0.92  |
| 2415               | 0.94                              | 21.44                        | 0.13                           | 0.89  |
| 2418               | 0.94                              | 21.62                        | 0.15                           | 0.89  |
| 2421               | 0.94                              | 21.84                        | 0.15                           | 0.86  |
| 2423               | 0.93                              | 21.97                        | 0.16                           | 0.84  |
| 2426               | 0.93                              | 22.15                        | 0.17                           | 0.81  |
| 2428               | 0.93                              | 22.27                        | 0.17                           | 0.80  |
| 2431               | 0.92                              | 22.46                        | 0.18                           | 0.71  |
| 2434               | 0.92                              | 22.62                        | 0.19                           | 0.69  |
| 2436               | 0.92                              | 22.72                        | 0.20                           | 0.69  |
| 2439               | 0.92                              | 22.87                        | 0.21                           | 0.67  |
| 2442               | 0.91                              | 23.03                        | 0.22                           | 0.63  |
| 2444               | 0.91                              | 23.10                        | 0.22                           | 0.62  |
| 2447               | 0.90                              | 23.22                        | 0.23                           | 0.56  |
| 2450               | 0.90                              | 23.32                        | 0.24                           | 0.52  |
| 2452               | 0.90                              | 23.35                        | 0.25                           | 0.50  |
| 2455               | 0.90                              | 23.42                        | 0.26                           | 0.49  |
| 2457               | 0.89                              | 23.44                        | 0.27                           | 0.49  |
| 2460               | 0.89                              | 23.46                        | 0.27                           | 0.46  |
| 2463               | 0.89                              | 23.48                        | 0.28                           | 0.41  |
| 2465               | 0.89                              | 23.47                        | 0.29                           | 0.36  |
| 2468               | 0.88                              | 23.42                        | 0.30                           | 0.33  |
| 2471               | 0.88                              | 23.36                        | 0.31                           | 0.34  |
| 2473               | 0.88                              | 23.30                        | 0.31                           | 0.28  |
| 2476               | 0.88                              | 23.22                        | 0.32                           | 0.25  |
| 2478               | 0.88                              | 23.13                        | 0.32                           | 0.25  |
| 2481               | 0.87                              | 23.00                        | 0.33                           | 0.20  |
| 2484               | 0.87                              | 22.87                        | 0.34                           | 0.14  |
| 2486               | 0.87                              | 22.75                        | 0.34                           | 0.12  |
| 2489               | 0.87                              | 22.61                        | 0.35                           | 0.06  |
| 2492               | 0.87                              | 22.44                        | 0.36                           | 0.01  |
| 2494               | 0.87                              | 22.31                        | 0.36                           | 0.03  |
| 2497               | 0.87                              | 22.15                        | 0.38                           | 0.07  |
| 2500               | 0.87                              | 21.97                        | 0.38                           | 0.12  |

<sup>(1)</sup> Relative to 180°

# LTCC Balun RF Transformer

## BLJC4-252R+

### Typical Performance Data



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 • Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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IF/RF MICROWAVE COMPONENTS

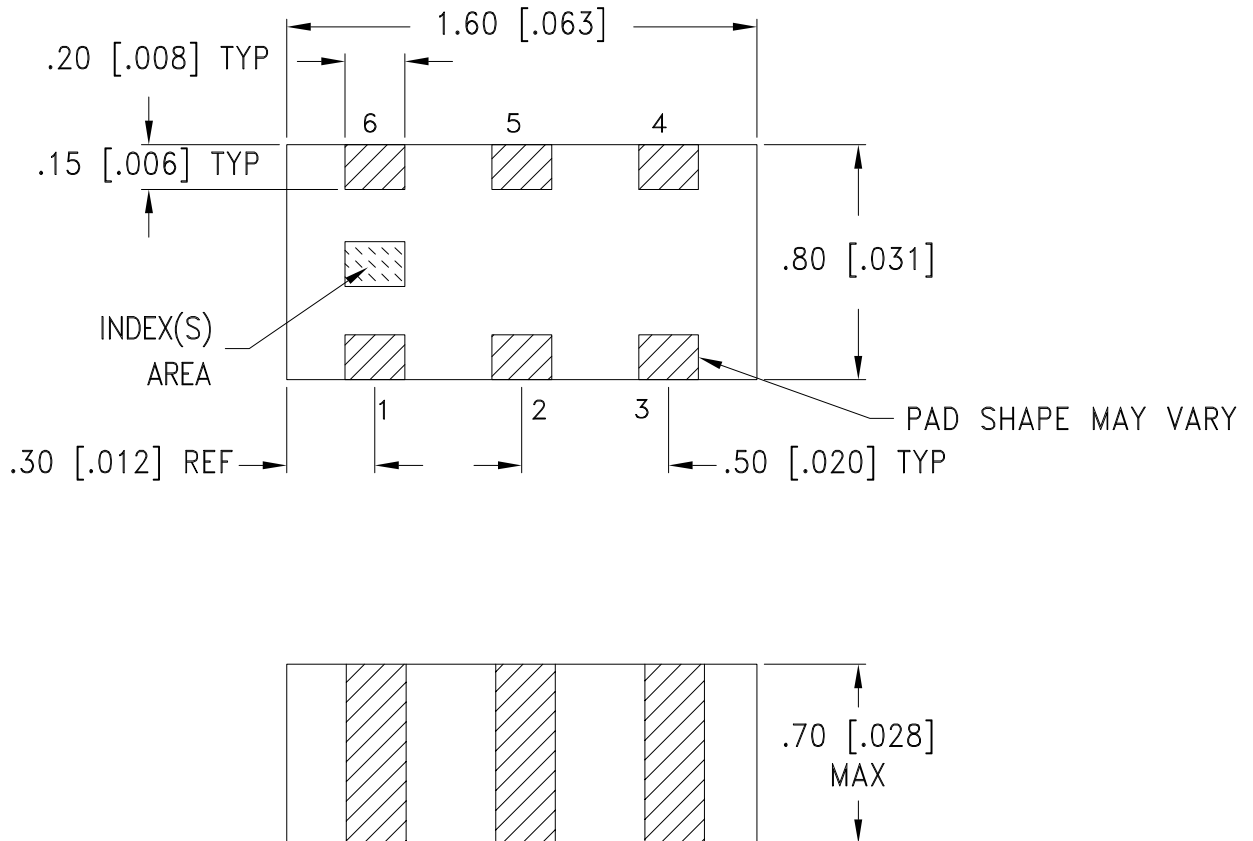
REV. OR  
BLJC4-252R+  
5/10/2019  
Page 1 of 1

# Case Style

JC

## Outline Dimensions

JC0603C



Weight: .005 grams

Dimensions are in mm [inch]. Tolerances:  $\pm 0.13$  mm

### Notes:

1. Open style, ceramic base.
2. Termination finish:

For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F114

## DEVICE ORIENTATION IN T&R



ILLUSTRATION 1

| Applicable Case Styles |           |
|------------------------|-----------|
| GE0805C                | JC0603C   |
| GE0805C-1              | JC0603C-4 |
| GE0805C-1AP            | JC0603C-6 |
| GE0805C-7              |           |
| GE0805C-9              |           |
| GE0805C-10             |           |
| GE0805C-11             |           |
| GE0805C-12             |           |

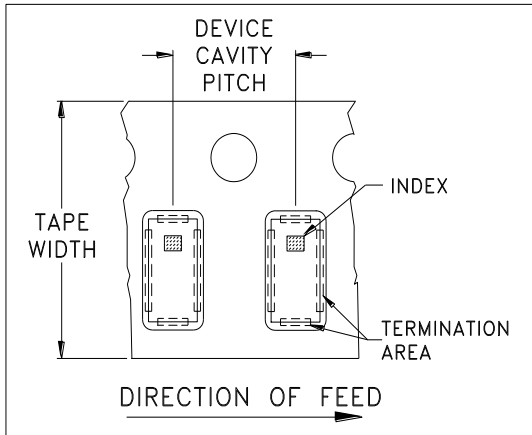


ILLUSTRATION 2

| Applicable Case Styles |           |
|------------------------|-----------|
| GE0805C-2              | JC0603C-1 |
| GE0805C-3              | JC0603C-2 |
| GE0805C-4              | JC0603C-3 |
| GE0805C-5              | JC0603C-5 |
| GE0805C-6              | JC0603C-7 |
| GE0805C-8              |           |
| GE0805C-15             |           |

| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel                    |      |
|----------------|-------------------------|-------------------|-------------------------------------|------|
| 8              | 4                       | 7                 | Small quantity standards (see note) | 20   |
|                |                         |                   |                                     | 50   |
|                |                         |                   |                                     | 100  |
|                |                         |                   |                                     | 200  |
|                |                         |                   |                                     | 500  |
|                |                         |                   |                                     | 1000 |
|                |                         |                   | Standard                            | 4000 |

Note: Please Consult individual model data sheet to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: [www.minicircuits.com/pages/pdfs/tape.pdf](http://www.minicircuits.com/pages/pdfs/tape.pdf)



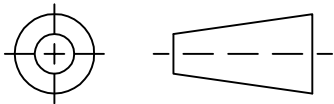
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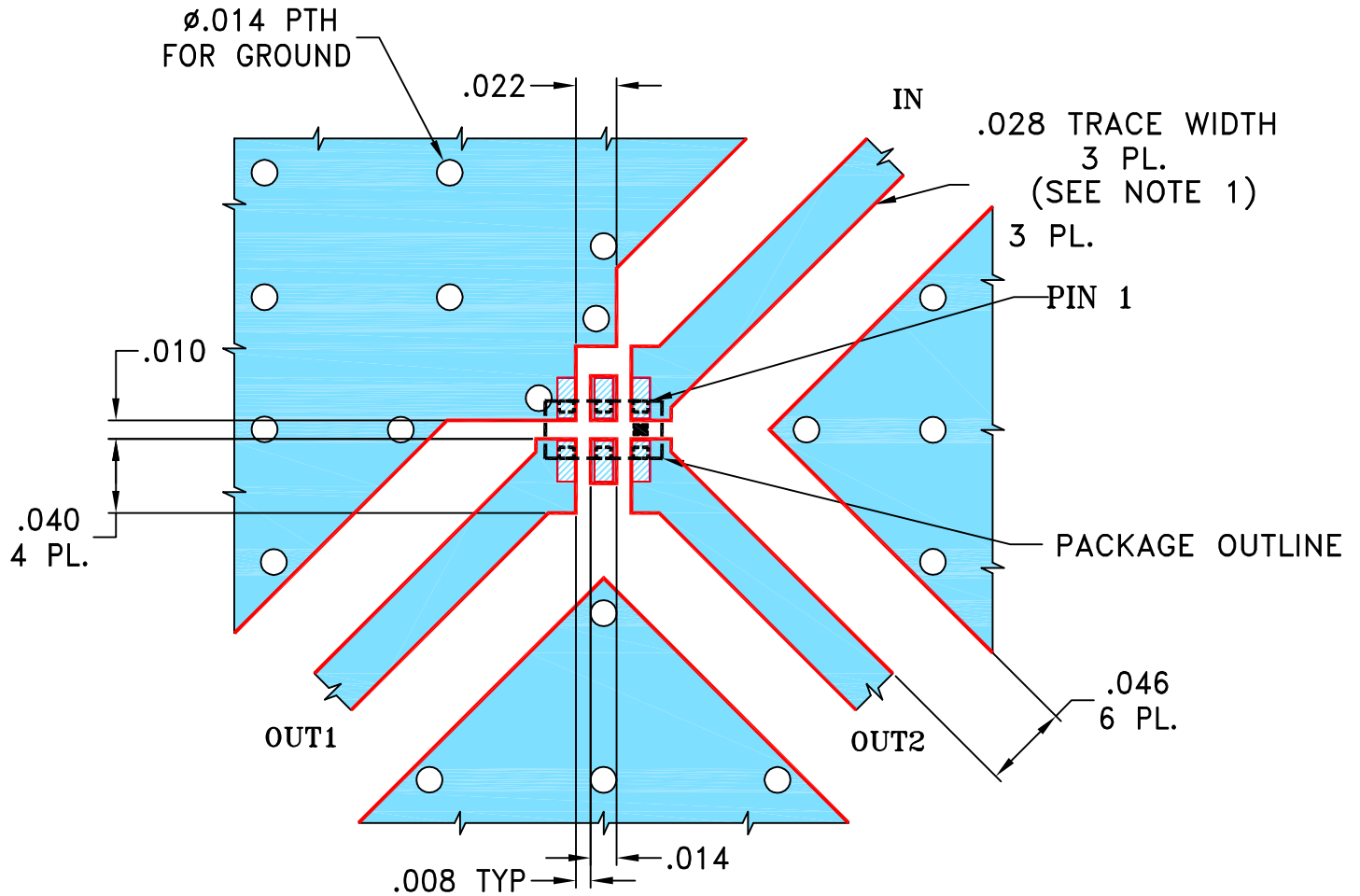
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No. | DESCRIPTION | DATE     | DR | AUTH |
|-----|---------|-------------|----------|----|------|
| OR  | M168200 | NEW RELEASE | 05/31/18 | NP | SL   |
|     |         |             |          |    |      |
|     |         |             |          |    |      |

**SUGGESTED MOUNTING CONFIGURATION  
FOR JC0603C CASE STYLE, "06TJ06" PIN CODE**



**NOTES:**

1. TRACE WIDTH IS SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS  $.016 \pm .0015$ . COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).  
 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

| UNLESS OTHERWISE SPECIFIED | INITIALS | DATE     |
|----------------------------|----------|----------|
| DRAWN                      | NP       | 05/30/18 |
| CHECKED                    | GF       | 05/30/18 |
| APPROVED                   | SL       | 05/31/18 |

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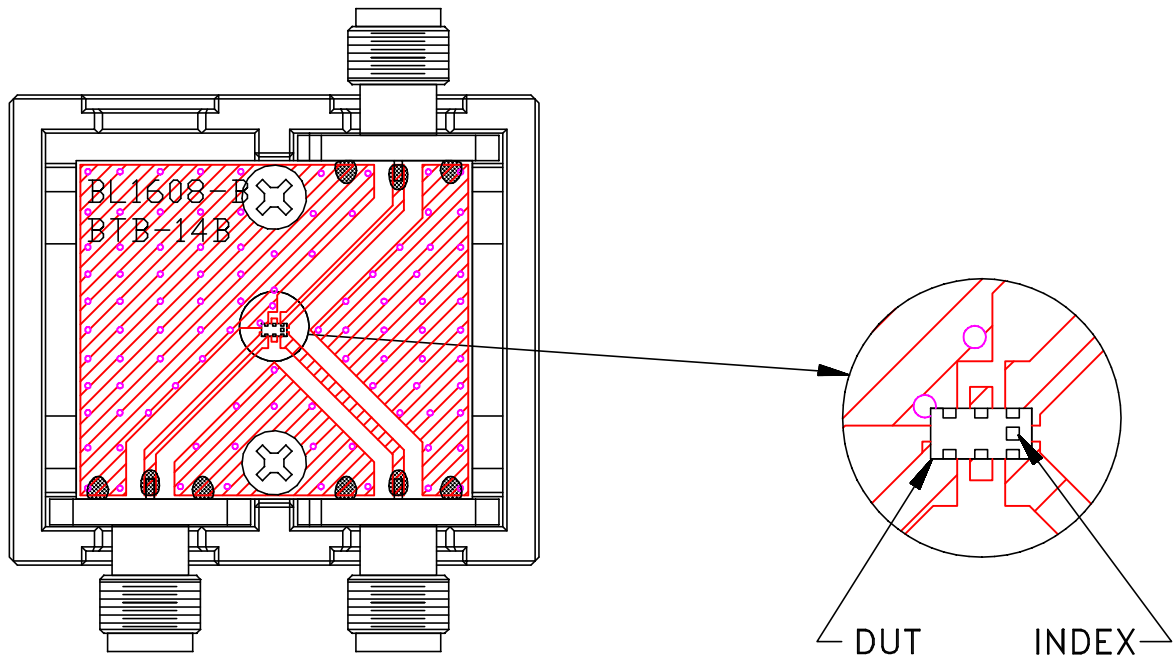
**PL, 06TJ06, JC0603C, TB-1013+**

| SIZE  | CODE IDENT | DRAWING NO: | REV:          |
|-------|------------|-------------|---------------|
| A     | 15542      | 98-PL-559   | OR            |
| FILE: | 98PL559    | SCALE: 10:1 | SHEET: 1 OF 1 |

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 ASHEETA1.DWG REV:A DATE:01/12/95

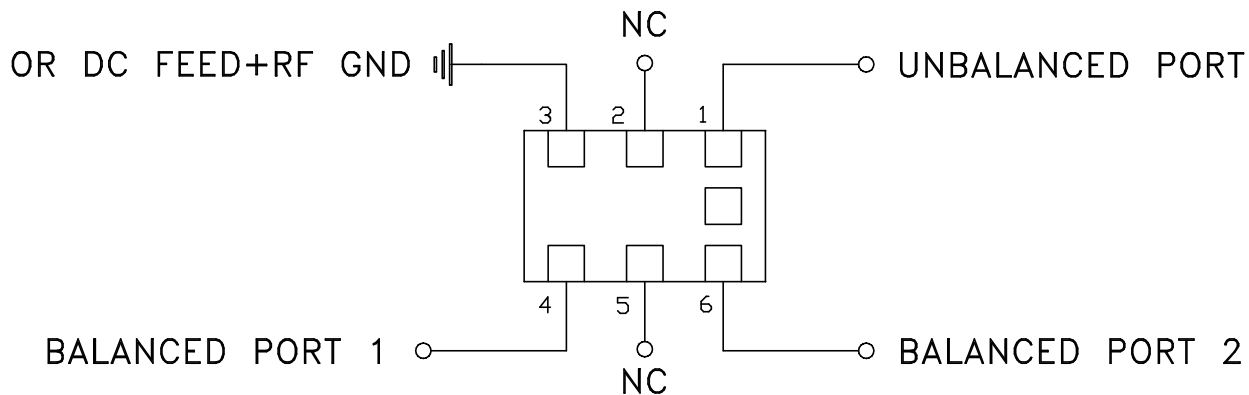
# Evaluation Board and Circuit

UNBALANCED PORT



BALANCED PORT 1      BALANCED PORT 2

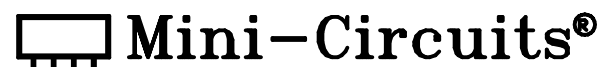
TB-1013+



Schematic Diagram

**Notes:**

1. 50 Ohm SMA Female connectors.
2. PCB Material: FR4 or equivalent,  
Dielectric Constant=4.5, Thickness=.016 inch.





All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification              | Test/Inspection Condition   | Reference/Spec   |
|----------------------------|---|--|
| Operating Temperature      | -40° to 85° C<br>Ambient Environment  | Individual Model Data Sheet  |
| Storage Temperature        | -40° to 85° C<br>Ambient Environment  | Individual Model Data Sheet  |
| Humidity                   | 90 to 95% RH, 240 hours, 50°C   | MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours |
| Thermal Shock              | -55° to 100°C, 100 cycles   | MIL-STD-202, Method 107, Condition A-3, except +100°C  |
| Solder Reflow Heat         | Sn-Pb Eutectic Process: 225°C peak<br>Pb-Free Process: 250°C peak                   | J-STD-020C, Table 4-1, 4-2 and 5-2; Figure 5-1   |
| Solderability              | 10X Magnification   | J-STD-002, Para 4.2.5, Test S, 95% Coverage  |
| Vibration (High Frequency) | 20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36) | MIL-STD-202, Method 204, Condition D   |
| Mechanical Shock           | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes                   | MIL-STD-202, Method 213, Condition A   |